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SCIENTIFIC AFFAIRS

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CONTENTS

INTERNATIONAL AFFAIRS

- Conditions for Faster Mail Delivery Examined
(Miroslav Spacek; PTT REVUE, No 4, 1982) 1

BULGARIA

- Data on Space Equipment Production Released
(BTA, 7 Dec 82) 6

CZECHOSLOVAKIA

- CSAV Interviews Indicate Future Progress
(M. Dastich, et al. Interview; SVET PRACE, No 21, 1982) . 8

- Czechoslovak Academy of Sciences Described
(DOKUMENTACNI PREHLED, 13 Sep 82) 23

POLAND

- Research-Development Process, Programs Outlined
(Various sources, various dates) 28

Organization of Process
Research-Development Application Programs,
Mieczyslaw Kazimierczuk Interview

YUGOSLAVIA

- Nuclear Energy Plans to Year 2000 Outlined
(KEMIJA U INDUSTRIJI, Sep 82) 40

- Innovative Work in Slovenia Encourages Innovation in Industry
(KEMIJA U INDUSTRIJI, Sep 82) 42

Briefs

- KRSKO Nuclear Power Plant Basin 43
Lola 30 CNC Control System 43

CONDITIONS FOR FASTER MAIL DELIVERY EXAMINED

Prague PTT REVUE in Czech No 4, 1982 pp 104-106

[Article by Eng Miroslav Spacek, Federal Ministry of Communications: "Mail Delivery Time"]

[Text] The speed with which mail is transported and the timeliness of its delivery are unquestionably among the most important criteria by which the public in any country judges the quality of postal services. It is not easy to meet these requirements consistently; they depend on many factors, some of which are difficult to influence. A legally constituted plan for postal transport alone is decidedly not enough: also necessary is precise adherence to procedures and directives by all workers involved in the mail-carrying process. Failure of one link generally hinders the performance of all the others. But in addition to the human factor, the reliability of the transport and delivery service is also affected by physical facilities, particularly mail transport centers, and the reliability of the carriers and transport facilities. The ultimate quality of performance is equally dependent on good cooperation by the public, particularly as regards adherence to mailing requirements.

The fact that all of the above-mentioned requirements must be met simultaneously is certainly one of the most important reasons why time limits for delivery have never been part of the universal legal specifications for the Czechoslovak mail service. Time limits for delivery of various types of mail have been defined only in the operating instructions contained in Postal Regulations II, where they are meant to be used in development of the postal transport plan.

In an attempt to solve this problem, the Federal Ministry of Communications asked certain European postal services how they established transport time limits for the public and what the responsibilities of the postal service are in regard to them. The responses confirmed that precise specification of delivery times and associated specification of the postal service's liability for compensation is an extremely complex task which the postal services usually do not address unambiguously in their compulsory general regulations.

East Germany

In the GDR, delivery times are specified by an internal instruction with which the public is not acquainted. They are based on requirements for rapid transport of information and the economically substantiated capabilities of the

postal transport network. The delivery time specifications differ for the individual types of mail and for the various levels of the transport network. Letters are to be delivered within the same bezirk on the next day and within 2 days in other bezirks, while international mail is to leave the country within 2 days of mailing. Parcels to be delivered within the same bezirk and rush parcels to be delivered anywhere in the country must be delivered within 2 days and those to other bezirks within 3 days, while international parcels must leave the country within 4 days.

The GDR postal service guarantees the contents of the mail if delivery takes unusually long and the contents are spoiled for this reason; express surcharges are the only fees returned. The management of the postal service decides on compensation with reference to the internal time limits mentioned above. In the case of letters, delivery times are monitored by means of control mailings, while package mailings are monitored through postal service documents. This monitoring is performed by selected postal employees in all bezirks, kreis and other large cities (selection for this work is considered an honor). They are employees involved with mail classification, with the exception of those at the transport centers.

Bulgaria

The compulsory general instructions in Bulgaria do not establish delivery times, but care is taken when developing the postal delivery plan to assure that these times are as short as possible. The post offices' connections to the transport network are precisely specified, and they must subordinate their own operations, particularly handling and dispatching, to this network. Postmasters and responsible employees are called to account for failures to adhere to the postal transport plan when they affect delivery times. Breaches of transport procedure are dealt with via poor-performance reports, which are sent not only to the post office from which the mail in question was sent, but also to its superior management.

Austria

Compulsory delivery times in Austria are defined in the postal law, which specifies a limit of 3 days for registered letters and 4 days for other registered mail. Postal responsibility of this sort does not apply to ordinary letters. At a time when the volume of postal operations is constantly increasing, delivery times are doubling. Since the work week was decreased to 5 days, no deliveries have been made on Saturdays, with the exception of daily papers, express letters and telegrams. The post regulations authorize postponement of the delivery of mail sent in such large quantities that it would create difficulty in delivering the rest of the mail. Under the same conditions, delivery of printed matter may be delayed to the next postal rounds. This makes it possible to prolong the total delivery time for these types of mail. The internal objective of delivering letters the day after mailing is met in about 90 percent of all cases. This result, which is considered excellent, was achieved by means of recent investment in modernization of postal transport (establishing postal express trains, mechanization of mail transport centers, introduction of containerization). In practice, delivery times are

checked with both "live mail" and control mailings. Devices for recording delivery times have not as yet given satisfactory results.

Switzerland

In Switzerland, delivery times are not specified in the compulsory general instructions. However, an internal directive requires that letters, manuscripts, daily newspapers, express periodicals and express printed matter be processed and dispatched without delay. The small size of the country and the numerous connections make a more strict specification unnecessary. In the case of parcels, the principle is that a package mailed in the morning should be delivered (insofar as postal connections allow) on the next working day, and in other cases on the second working day after the day of mailing. The postal law specifies that in case of a delay of more than 24 hours beyond the normal delivery time for registered mail, packages and mail of declared value, the postal service will compensate actual loss, not to exceed 150 Swiss francs. The normal delivery time is determined from case to case in terms of the connections available. The postal service is not responsible for unregistered mail, but claims are checked in order to discover organizational errors and fault by postal workers. Delivery times are checked every few months at three post offices designated by the general management; three new offices are designated every year. The canton management organizes its own more detailed checking for the individual stages of transport. Operating inspections play an important role; every year the transport activity of 200 post offices is monitored.

* * *

Supplement 10 of the Postal Regulations, developed on the basis of an evaluation of foreign experience, but particularly with reference to the actual capabilities of the postal transport and delivery services, specifies compulsory delivery time limits and the associated responsibility of post offices. Mail-carrying time refers to the collection, transport and delivery. Carrying begins on the day the mail is received by the post office and ends on the day of its delivery (or when notice is given or arrangements are made for it to be called for). Timely delivery of domestic mail entails delivery of letters, postal money orders, manuscripts of value and rush parcels no later than the second day after mailing, and parcels no later than the fourth day after mailing.

Saturdays, Sundays and other nonworking days are included in the time limit only if the mail in question was required to be delivered on these days by the relevant provisions of the Postal Regulations and the established delivery responsibilities of the cognizant post office. Adherence to these limits is always contingent on the meeting of mailing requirements by the customer. If a piece of registered mail is delivered later than the time limits noted, the post office makes restitution, on the basis of the claim procedure or authorized payment claim as per Para 55 of the Postal Regulations, and the standard surcharge for rush delivery of parcels.

While designating delivery times and the extent of post office responsibility, it was also necessary to devise more objective methods of checking mail delivery times. The solution of this problem is most difficult in the case of

ordinary letters, for when these are delivered the post office has no records from which the quality of service can be evaluated. Previous monitoring on the basis of "live mail" was limited to determining transport times, and accordingly took no account of the final phase, namely delivery. In addition, the monitoring was mostly conducted at mail transport centers, by personnel who had a certain stake in the results achieved. On the other hand, this method was used to check a large number of items (for example, a one-time nationwide check in 1978 dealt with 522,000 ordinary letters).

The new method of monitoring delivery times for letters, including mailing, transport and delivery, is that of control mailings, which selected ministry employees will send between all districts in Czechoslovakia. Each piece of control mail will contain a control card suitable for machine processing. package delivery times will be monitored by the same group of reliable employees for the largest post office in each district. The control sample will include at least 100 packages mailed separately on a single day.

The data from this mailing will also be machine-processed.

A computer output will make it possible to determine the total number of items mailed, the total number of items delivered within the specified limit (taking account of the provisions of Para 1024 of the Postal Regulations II), a survey of items delivered after the established time limit, broken down by point of mailing and point of delivery, and a survey of points from which control mailings were not dispatched.

The size of the test sample which would characterize the situation in the transport network with sufficient accuracy was determined using the methods of mathematical statistics. The quality level will be checked by control mailings sent from n mailing points to $n-1$ destinations. A total of $N = n(n-1)$ test items will be mailed. If we estimate the percentage of delayed items as $P = 10p$ (percent), and if we wish for the result to have a relative accuracy

$$\delta = \frac{r/N-p}{p} \quad (1)$$

where r is the number of delayed items out of the total number N , then the required number of pieces of test mail is given by the equation

$$N = \frac{\mu \frac{\alpha}{2} (1-p)}{\delta^p \cdot p} \quad (2)$$

Here $\mu \frac{\alpha}{2}$ represents the cutoff quantile for a confidence coefficient value of $1 - \alpha$. It follows from equation 2 that with the given value of p and of the confidence coefficient $1 - \alpha$, the sample size increases as the demands for relative accuracy of the estimate are intensified. If the relative accuracy is constant, the sample size will be greater the smaller the value of p . The sample sizes for the most commonly used confidence coefficients of 0.90 and 0.95 are given in the tables.

$1-\alpha = 0,90$

p	0,20	0,10	0,05	0,01
0,20	271	809	1 286	6 898
0,10	1083	2436	5 142	26 790
0,05	4330	9742	20 586	107 159

$1-\alpha = 0,95$

p	0,20	0,10	0,05	0,01
0,20	385	865	1 826	9 511
0,10	1538	3 459	7 302	38 042
0,05	6149	14 834	29 204	152 186

The fully satisfactory values are given for $1 - \alpha = 0.95$ in the enclosed sections of the table; for example, to test the hypothesis that 95 percent of the items mailed are delivered within the specified time, with a confidence coefficient of 0.95 and a relative accuracy of 10 percent, it is necessary to use a test set of 7,302 items. Thus we can close this discussion by stating that $N = 1,000$ test-mailed items gives sufficient reliability and relative accuracy; but in reality the test mailing will be still larger, since $n = 122$, i.e., $N = 14,762$ items.

The new checking method, which will go into operation this year, will make it possible not only to check the overall quality of all stages of the mail-handling process, but also to track the specific links in which the delivery time does not meet the specified limits. The final data will be available to the Federal Ministry of Communications, the two central communications directorates and the local communications directorates (or postal directorates). The findings will be thoroughly analyzed or checked in more detail by means of additional investigations so that measures can be taken to eliminate the causes of delays in the mails.

8480

CSO: 2402/74

DATA ON SPACE EQUIPMENT PRODUCTION RELEASED

AU070936 Sofia BTA in English 0810 GMT 7 Dec 82

[Text] Sofia, Dec 7 (BTA)--Ten years ago the first Bulgarian space appliance--one for measuring the concentration of the electronics and ions in the ionosphere--was launched in round-the-earth space the "Interkosmos-8" satellite. Since then the Bulgarian space equipment has been flying in space annually--on satellites, meteorological and geophysical rockets, space craft and orbiting stations. Space appliance-building has turned into one of the industrial sub-branches. More than 70 enterprises in this country are engaged in fulfilling the designs of the central laboratory for space researches, the central laboratory for higher geodesy, the geophysical institute and other institutes and laboratories of the Bulgarian Academy of Sciences and departments working on the "Interkosmos" programme. A number of instruments designed for space research, have already been applied on the earth, in various branches of the national economy. This type of space transfer will be considerably extended in future.

Space appliance-building in Bulgaria develops in six main directions: electronic devices and systems for plasm measuring, electrophotometric apparatuses, earth measuring complexes, devices for meteorological rockets, for distant earth probing, for piloted measurements by spacemen.

During the two Bulgaro-Indian space experiments with the "Centaur" rocket, the Bulgarian optical electrophotometer "EMO" was used to obtain valuable data about vague optical radiations on the equatorial region. The "ISOH" series of devices for measuring spectral reflection characteristics of earth objects have been applied in the aero-space researches in the Soviet Union, Czechoslovakia, Poland, Cuba and other countries. In Italy and Yugoslavia there are operates earth stations, [as received] equipped with Bulgarian devices, for measuring the ionispheric absorption, and in Cuba, Vietnam and in India--stations for monitoring the natural optical emissions in the round-the-earth space. Similar stations were used in an expedition variant in Greece and Guinea.

For the flight of the first Bulgarian spaceman in 1979 the Bulgarian designers have developed three unique appliances--a multichannel chamber

"Spektar-15" for measuring and registering the spectral reflection characteristics of earth objects, a photometric system for monitoring shining objects "Duga" and a device for studying the psycho-physiological state of the spaceman, "Sredets." These devices were operated on the "Salyut-6" space station and are now included in a set of the scientific instrumentation of "Salyut-7."

Last year two Bulgaro-Soviet artificial satellites were launched into round-the-earth orbit--"Interkosmos Bulgaria-1300" and "Meteor-Prioroda." On the first of them designed for global study of the high earth atmosphere and in particular for studying the relation between the ionosphere and the magnetosphere, there have been mounted 12 Bulgarian devices and systems. On the second satellite which probes the earth from the space, the Bulgarian appliances are three. On both satellites the instruments continue to operate faultlessly, although the "guarantee period" has expired long ago.

Now the Bulgarian appliance builders are getting ready to participate in new big international space projects. Together with Soviet and French specialists they are designing a probing apparatus to be launched in 1986 for studying the Halley's Comet. Participation is also planned in the intricate complex of devices for direct studying of Mars and its satellites.

CSO: 2020/7

CZECHOSLOVAKIA

CSAV INTERVIEWS INDICATE FUTURE PROGRESS

Prague SVET PRACE in Czech and Slovak No 21, 1982 pp 3-7

/Interviews with members of CSAV [Czechoslovak Academy of Sciences] and text prepared by M. Dastich, J. Hajkova, J. Honzik, L. Hoschl, J. Kottas, M. Moricova, M. Rubesova/

[Excerpts] Out of the Past into the Future

[Question] The Czechoslovak Academy of Sciences /CSAV/ is "only" 30 years old. We asked its chairman, Academician B. Kvasil, what its future role will be.

[Answer] The year 1982, which marks the 30th anniversary of the CSAV, is very important for its future work. As early as January of this year, we discussed with the CPCZ Central Committee a long-term program which will determine the academy's entire future orientation. The starting point in the elaboration of this program was rooted in the resolutions of the supreme party and government bodies, especially resolutions of the 16th CPCZ Congress and the Central Committee plenum of 1974 which dealt specifically with the questions of scientific progress in this country. The academy bases development in all its disciplines on these resolutions.

[Question] The foundation of your efforts, of course, remains in scientific and research endeavor?

[Answer] The content of the scientific research program in the sphere of basic research was set forth on the basis of two considerations, namely, to contribute as best as we can to the fountain of world science, while not losing sight of research which helps the development of our own national economy.

[Question] There have been calls for some time now for higher effectiveness in scientific research.

[Answer] There are two roads leading toward this goal. The first is the proper selection of subject matter which must reflect the professionalism and capabilities of our research facilities, as well as the needs

of our economy. It is not only in the sphere of natural and technical sciences but in other disciplines as well, that our research institutes must first deal with that which most enhances the effectiveness of production. The second road consists of the shortening of the science - production - utilization cycle. It is absolutely necessary to introduce as quickly as possible all achievements in basic and applied research into practical application, thus transforming them into assets needed for further political, social and economic progress.

[Question] How do you propose to attain these objectives?

[Answer] We have introduced a system of priority tasks. In order to contribute most effectively to the world fund of knowledge, we have joined our efforts within the framework of international cooperation, notably with Soviet organizations. For these are rather ambitious forms of research which we would be unable to handle alone. Therefore, we share with scientists of the other socialist countries in many programs. It is, first of all, the INTERKOSMOS program and joint nuclear research in Dubna; we also participate in the resolution of thermonuclear syntheses, and there is good cooperation in biological sciences, for example, in the sphere of gene engineering, the struggle against epidemic disease, etc. International cooperation in the latter programs is conducted under the INTERMOZG program. All in all, we participate in 16 joint programs.

In order to focus our attention systematically on scientific research which would most rapidly bring economic results, we have concentrated our endeavor on the so-called targeted projects. These derive from the state targeted programs approved last year.

[Question] Which spheres of our economy will most benefit from your targeted projects?

[Answer] Practically all of them, engineering, electrotechnology, agriculture and electronics, including optoelectronics. Of importance are the projects for technological equipment and scientific instruments needed in the production of integrated circuits, e.g., electron, ion and roentgen lithography. Another targeted project deals with the search for raw material deposits at great depths. This will be our contribution to the resolution of problems related to our insufficient raw-material base. The goal is to eliminate the lengthy and costly test probing and surface mapping of our territory at greater depths. Other projects are important for our agriculture. We are dealing with integrated protection of plant and animal life from parasites, gene engineering and manipulation, etc. The utilization of phytomass should produce economic gain, for example, lumber waste and straw can be used for the production of fodder yeast. Cellulose waste can also provide production raw material. This is the aim of the new cellulose plant planned in Paskov.

Altogether, there are 19 targeted projects. Individual research stages are contractually ensured in agreements with our partners. The aim is to achieve concrete results within 10 years at the latest. So much for the content of our future work.

[Question] The program, however, also outlines how these tasks will be implemented.

[Answer] One section of the program sets the task of even closer cooperation between our facilities and the implementation sphere, not only branch ministries but directly with the VHJ [economic production units] and large enterprises as, for example, SKODA, CKD, as well as certain JZDs [unified agricultural cooperatives] (e.g., Prace near Znojmo). I would like to emphasize that we now have very good cooperation with the Ministry of Electrotechnology. All agreements clearly specify that scientific and technological achievements would be implemented by production as rapidly as possible. We believe that it is only in this manner that the Academy's efforts will more closely reflect practical needs and shorten the above-mentioned science - production - utilization cycle.

[Question] Does the adopted program include progress in social sciences?

[Answer] Here too, the aim is to gear research toward practical application. For this reason, we will have to intensify cooperation with party and government organs, trade unions, etc. The academy offers a much more effective utilization of the respective research institutes for concrete tasks in the sphere of planning, sociological problems, social development of society, struggle against hostile ideologies and, last but not least, for education and formation of the profile of socialist man. At the same time, we do not intend to overlook the humanities as, for example, the sciences of art, history, etc. Our long-term goal is also a harmonious profile of the population's cultural level in the period of accelerated technical development of humanization of the technical branches.

Another important area of responsibility for us concerns our prognostication activity. We must provide estimates of the direction in which our individual disciplines will be developing. In other words, we must use the academy's assets more intensively in long-range forecasting of our society's progress. The CSAV is ready to assume responsibility for this important effort on the national level.

[Question] In order for the CSAV to fulfill all these tasks successfully, it will need organizational and cadre backing, capital investment...

[Answer] The program does not overlook the economic and organizational support of our work. We must substantially improve the realization base, i.e., establish additional developmental workshops and prototype laboratories, ensure access to scientific and technological data, equip our facilities with modern instruments... We realize the support the state can provide for science is not unlimited. Consequently, we must apply strict measures of economy and conservation in handling literally every last crown, and make sure that every investment brings the best possible results. It is not always easy to decide where and in what amounts to make allocation of funds.

In closing, I would like to note that we also devoted much attention to management matters, both within the academy and nationwide. Within the academy, we have adapted the structure of the presidium and its auxiliary organs to these new tasks, we are in the process of integrating institutes, establishing regional centers (for example, a biological facility in Ceske Budejovice) and, following thorough analysis, we have pinpointed certain programs which will have to be cut for a number of valid reasons. We aim at a concentration of effort and means to avoid their ineffective splintering.

We have great hopes for cooperation with the Ministry of Education. We want to mutually harmonize our programs, establish joint worksites in order to make the best possible use of the academy's scientific potential and often unique outfitting of certain laboratories and workshops for the education of young specialists.

This then is a highly condensed survey of the academy's future tasks.

What Would Academician Heyrovsky Say to All This?

When I walked around the Lesser Quarter in Prague looking for Vlasska St, I reviewed in my mind, as if a student before a test, what this scientific discipline of which I wanted to learn more had in its magic power. It is currently able to detect not only noxious matter in the air, water and soil and analyze the composition of heavy metals in salt water, but also determine the level of medication in an organism and answer the question of how much lead can penetrate a tin of canned food. In addition, I know that it performs many other miracles.

The CSAV Institute of Physical Chemistry and Electrochemistry of Jaroslav Heyrovsky bears the name of the discoverer of polarography who, as first in this country, was awarded the Nobel Prize for it in 1959. Many years have passed since then, yet the polarographic method is still considered one of the fundamental processes in analytical chemistry. It has not stagnated in its development. The scientists at the institute made sure of that and carry on the work of Academician Heyrovsky with apparently the same dedication and success as the founder.

As stated in the definition, polarography is an electrochemical analytical method the basis of which is in measuring the dependance of the intensity of current flowing through the input voltage (polarographic curve) in electrolysis of the solution by means of a mercury droplet electrode. Naturally, for a layman these words are not easy to understand; therefore, let us hear from an expert, Dr. Robert Kalvoda, deputy director of the institute who, incidentally, studied under Heyrovsky: "It is a relatively simple, yet very sensitive method for determining the presence of many noxious substances, such as pesticides. It alerts us to concentration which could be very dangerous for consumers, thus the method is essential even for the food industry, just as for the pharmaceutical chemistry, which uses it to identify toxic matter."

Progress, however, does not stand still and new, more modern but also more complicated and expensive methods had been discovered, e.g., the chromatographic method or atomic absorption spectroscopy...which provide serious competition for polarography. At first glance, it would appear that polarography had been surpassed, but this did not last long. It all began about 10 years ago when, under the supervision of Lecturer Kalvoda, a complex rationalization brigade was organized where research was represented by scientists from the institute and the production sector by developmental researchers from the Laboratory Instruments enterprise. They provided a definitive answer in the form of a new generation of Czechoslovak pulse polarograph. The problem stemmed from the fact that the original classical method did not allow raising the sensitivity of polarographic instruments.

It was only progress in electronics which made possible the construction of a very sensitive pulse polarograph.

"The bulk of our work consists of development of polarographic instruments. Naturally, there is little sense in conducting any type of research unless it can eventually be applied in production. Consequently, we based our work on collaboration with the specialists from the Laboratory Instruments enterprise. This soon produced good results. Each new idea we came up with was first tested in the enterprise. This was followed by a discussion where the practical merits of the idea were weighed and methods of possible utilization examined. We have gradually developed and built polarographic instruments which are as much as a thousand times more sensitive than the original. Among the latest models now on the market is the PA 3 polarographic analyzer with a static droplet electrode which makes possible automation of the entire polarographic method. As one of the first in the world, it was manufactured by Laboratory Instruments which simultaneously produce the previous PA 2 model. Eighty percent of the production capacity goes for export." Last year the PA 3 was awarded the gold medal at the Brno International Fair. In contrast with the classical method when analysis took about 20 minutes, today the new methods provides the desired results in 100 seconds.

The most timely usefulness of polarography today is in the environmental sphere when pollution causes infestation by the most diverse types of harmful matter. Current development in this field leads to automated analyzers based on polarographic principles, since these provide reliable results rapidly.

Many years ago, Academician Heyrovsky put together the first polarograph. A few decades later, his pupils managed to enrich polarography by new discoveries, especially in the sphere of the natural environment, and bring it so far today that in the near future a UNESCO coordinating center for electrochemistry of the natural environment is to be established within the institute. What would the teacher have to say to this?

How to Mass Produce Intelligent Matter?

Everyone agrees that the scientific and technological revolution began with the invention of the integrated circuit for minicomputers and microprocessors.

The integrated circuit is the basic component of all modern instrument and machine equipment. Its production presupposes the ability to emplace hundreds of transistors on an area of 5 square millimeters. It cannot be assembled by hand alone. The human hand must be equipped with a micromanipulator and the human eye with optical aids. Despite the invention of assembly machinery controlled by man, the outfitting of industrial production branches with microelectronics was a slow process all over the world because production of an integrated circuit took a long time even with the assembly machinery. It was nothing but a piece of manufactured product, albeit of an advanced type.

Then we heard that a machine had been developed in the United States which could mass produce the integrated circuit. Analysts had anticipated the eventual invention of such a machine. The country which owned it could modernize its industry faster than anyone else. In America, this equipment became the most guarded secret, since it in effect made economic blackmail possible.

During about the same period, a few scientists and technicians were working on similar equipment at the CSAV Institute of Instrument Technology [UPT] in Brno under the supervision of Academician Armin Delong. Although they did not enjoy the same conditions and had no knowledge of the American prototype, they succeeded as only second in the world in developing a functional and unique electronic lithograph.

This bit of news acted like a bomb, since it had been anticipated that the United States would maintain a monopoly for several years. The institute staff did not consider this achievement a sensation, but rather a logical culmination of long and dedicated work. Back in the early 1950s, the institute workshops produced, for example, the electronic microscope which went into production in 1955 and has since become, in its eighth incarnation, a popular product of our industry on foreign markets. The Metra Blansko enterprise had received from the institute a prototype of a laser interferometer. This also was, and perhaps still is, the hit of the season.

The scientific achievements and sensations tend to overshadow the research methodology of the institute. Ever since the early stages, management has always established contact with potential producers. It willingly opened the door to technicians, technological specialists and economists. In most cases, this meant that in the final year of research and development, the future producer was already part of the team, which enabled him to assess objectively and early enough what his enterprise had to do to create conditions for the realization of the new product.

This methodology was the sword which cut the Gordian knot in the sequence of research - production - utilization, nor should one underestimate the moral factor involved. Enthusiasm breeds more enthusiasm, and if the producer personally witnesses the enthusiasm of the researchers, he himself becomes dedicated to the cause and more easily overcomes obstacles which are bound to emerge with any new product. The cycle of transferring research into production thus becomes shorter by at least a year.

Also interesting in the work of the institute is its personnel policy. All told, it employs only 200 people, of whom 100 are scientists and technicians, while another 60 slots are reserved for outstanding workers capable of turning the impossible into the incredible. Only the remaining 40 people take care of transportation, building maintenance, food catering, the reception area, as well as all administration. We must admit that such a composition of a collective is not exactly typical in our conditions. Also unusual is the devotion to work. It seems that this institute simply does not tolerate second-rate performance. In short, one might say that here is a case of the right people in the right place.

Equally interesting would be a glimpse at the capital investment effectiveness of equipment-outfitting in the institute. The conservation trend in this sphere which is just beginning to penetrate our scientific establishment, is already well known here. In other words, it has long become an accepted factor. A scientist possessed of truly innovative vision is also able to apply effective improvisation in the methods of research. Those are the words of Armin Delong, the institute's director.

The UPT was established for the needs of the Academy. The technical disciplines of the CSAV and their institutions had at the time of their establishment often found themselves with empty hands. Scientists the world over were building the needed instruments themselves. Since then, however, many companies have come to the realization that production of scientific equipment can be a very profitable enterprise. Production and mass production followed.

The results of the experienced UTP collective henceforth focused on production and became participants in the profitable exchange and trade in scientific instruments. Put in lay terms, we can exchange our outstanding industrially produced instruments for other top-quality equipment available in other countries, even if this is done indirectly through the intermediary of our foreign-trade enterprises.

But let us return to the electronic lithograph. One of the first theoreticians of the scientific and technological revolution was a Czech sociologist and philosopher, Radovan Richta. We refer to him here primarily because it was he who had formulated the concept of this revolution as a state where science itself becomes a productive force. Nowhere is this theory more applicable than in microelectronics. In order to realize ideas, it is essential to find the means with which to do so. Integrated circuits represent the materialization of this idea and simultaneously the long-sought means. They add to the conditions of production, namely, energy, material and labor, a new element of information translated into impulses.

In a state which possesses a developed electronics industry, all other spheres of material human endeavor progress faster than ever before.

Return to Nature Its Lost Balance

When at the end of the Sixth 5-Year Plan the CSAV management deliberated on the targeted programs by means of which its institutes were to respond to the most serious problems facing us, it ruled without hesitation in favor of two programs of the Entomological Institute. It is actually one single program, since the implementation of its first part, "Integrated Protection of Plants," simultaneously deals with the second, "Ecological Optimization of Environmental Protection."

We discussed the integrated protection of plants with Dr Karel Novak, Candidate of Sciences and deputy director of the Entomological Institute. Dr Novak explains: "Our aim is to find ways, methods and procedures of plant protection which would reduce the need for the use of chemicals to the lowest possible level, to formulate principles of their least harmful application, and replace them with natural biological protective agents which do not infect the soil or what it produces. With respect to chemical protection, we have formulated ways of reducing its harmful effects via three main principles. First, to use insecticides only when the damage threatens to spread beyond acceptable economic bounds, since treating plants and trees on a calendar plan could cause more damage than the attacker. Second, choose the best possible timing for unavoidable chemical intervention so that most of the effect is absorbed by the attacker and least by the vegetation we are protecting. Third, wherever possible use selectively operating insecticides of which, however, there are not enough."

A substance effective against the leaf-eating caterpillar in vegetable and fruit gardens has already been discovered 20 years ago. It was then patented as a method of using the spore called *Bacillus Turengiensis*. The producer is JZD Slusovice and the substance will probably keep its original name Baturin.

Another name without a producer as yet is Boverol made from the entomophagous mushroom *Beauveria Bassiana*, which can be used in a moist environment against caterpillars and larvae.

An entomological hit of the past 10 years throughout the world has been the so-called feromones. These are substances making possible insect communication.

Feromones have been successfully used here in determining the degree of attack, timing of chemical protection, as well as directly against the attacker in orchards and especially forests.

In his book "Remarkable Encounters," Dr Jan Zdarek offers interesting information on the feromones, i.e., insect communication. It is too bad we cannot assist the feromones from time to time through communication

among higher species. Words, evidently, are sometimes not enough as we see in the institute's intense effort to develop usable and effective protective substances in this area.

Development of Society

Our society, which is on the road of building socialism and communism, must develop on the basis of knowledge and application of the scientific legalities of its progress and motion. Consequently, institutes dealing with specific problems of social sciences are an integral part of the CSAV. The basic methodological principles in these institutes are anchored in Marxism-Leninism. This teaching, however, must be constantly and creatively developed, which is one of the basic missions of these institutes. There are many of them, for example, the Institute for Philosophy and Sociology, the Psychological Institute, the Oriental Institute, the Pedagogical Institute, etc. We obviously cannot in this short historical presentation on the academy's 30th anniversary include details on the work of each of its institutes. We encounter the results of their work at every step in our everyday life, not only in the forms of applied science but also in the form of a considerable amount of published material which is reaching the readers and acquainting them with the results of the efforts of our scientific front.

The Czechoslovak Academy of Sciences is a national organization. One of its component parts is the SAV whose many institutes and scientific work-sites have achieved world fame through their accomplishments. We have asked Academician and SAV Chairman, Vladimír Hajko, about specific tasks handled by the SAV and the results achieved.

[Question] Can you briefly acquaint our readers with the social mission of the SAV?

[Answer] The establishment 30 years ago of the CSAV and shortly thereafter the SAV, was part of the purposeful policy in science and technology of the CPCZ and our state. Based on the example which had proven its merit in the USSR, the CSAV and SAV have gradually become scientific institutions where we develop at the individual worksites and in scientific associations basic research in a wide spectrum of specialized sciences which unites within the CSAV and SAV the best qualified specialists in the individual scientific disciplines. The focal point of the academies' social mission rests primarily in the advancement of basic research which in its extent, content and quality reflects the needs of our socialist state. We consistently fulfill the scientific research and organizational tasks set forth for our science in the international division of labor within the partnership of the countries of the socialist community, ensure flexible links of our science with world science, and create conditions for the achievements of world science to become as quickly as possible a part of the consciousness, thinking and action of all our scientists and specialists. An important part of the academy's mission, especially today, is an active share in the effort of our society toward effective application of scientific findings in production, planning and management toward progress throughout our socialist society.

[Question] How would you characterize the current state of achievement in the SAV?

[Answer] The SAV is an organic component of the CSAV. Currently it has more than 4,500 employees, which represents about 30 percent of all CSAV personnel. Of these 4,500 plus, 1,129 are scientists, i.e., people with academic titles of doctor or candidate of sciences. The SAV scientific institutions are divided into three sections. The section for mathematical, physical and technical Earth and cosmic sciences has 1 center (combining 3 worksites) and 12 other scientific worksites. The section for chemical, biological and agricultural sciences has 3 scientific centers (combining 11 worksites) and 5 other worksites. The section for social sciences has 14 scientific worksites.

The focal point of the SAV research base is located in Bratislava (77 percent of the SAV staff), while 9.7 percent are in the West Slovak Kraj, 1.8 percent in the Central Slovak Kraj, and 11.5 percent in the Eastern Slovak Kraj. At the scientific worksites of the SAV and institutions of higher learning throughout Slovakia, we conduct basic research in practically all specialized sciences which need to be developed in our socialist society.

The SAV, as a learned association, currently has 91 members, of whom 36 are academicians, and 55 corresponding members; 58 of them are simultaneously members of the CSAV.

[Question] How would you assess the scientific results achieved to date by the SAV?

[Answer] We have had success in the sphere of mathematics, both in scientific orientation and theory of real functions and algebraic methods, graphs and automation. We have achieved valuable results and rich experimental data in the sphere of cybernetics, ultrahigh-conductivity, microelectronics, optoelectronics, and in research in amorphous metal materials. These were used in the production of the RPP-16 third-generation computer, in ultrahigh-conductivity magnets, integrated circuits, and elsewhere. High quality has also been achieved in research on composite metal materials on the aluminum base, and work on construction systems with the application of the latest findings on the structure of construction materials. We have achieved a solid base in scientific research in astronomy, geophysics, geology, geography, as well as in hydrology and hydraulics. In chemical sciences, we had important results in saccharide, silicate and macromolecular chemistry, with special emphasis on exploitation of the domestic raw-material base. Many of the above processes have already been applied in production and have proven highly beneficial to our national economy. At biological and medical worksites, we have successfully mastered progressive methods of research in the area of virology, encology, molecular biology and genetics, general physiology and neurophysiology, endocrinology, pharmacology, and experimental surgery. Also progressing well is ecological research, work in the physiology of farm animals, in

helminthology, dendrobiology, phytopathology and entomology. Here too, the beneficial effect of achievements in these disciplines on the national economy has been remarkable.

Our collectives have for years now been achieving generally recognized results in their participation in important international programs, such as the INTERKOSMOS project, the program of the Joint Institute for Nuclear Research in Dubna, and others. Among the creative works of the social sciences institutes are several important publications in the sphere of philosophy and sociology, economics, pedagogy and psychology, archeology, history of the European socialist countries, history of our own nation, its literature, peoples culture, linguistics... Special credit goes to the SAV for enriching Slovak national culture by such significant works as the Slovak Encyclopedia, Slovak Atlas, Geobotanic Map of Slovakia, Slovak Dictionary, Slovak-Russian Dictionary, Slovak Gazetteer, and others. The scientific achievements of members and employees of the SAV have to date been honored by 52 Klement Gottwald State Prizes, and 33 National Prizes of the Slovak Socialist Republic. Since the establishment of the SAV, its staff has provided our national economy with more than 1,200 inventions.

[Question] What are the principal problems confronting the SAV at the present time?

[Answer] Besides the traditional sustained concern for the fulfillment of the State Plan for Basic Research, we currently devote great attention primarily to the problems of integrating science and production. Many measures have been adopted which are being implemented through a concentration of research capacities, application of a targeted programmatic approach to the resolution of scientific and technological problems, formulation of the scientific program for the worksites, and creating effective links between SAV institutions and the production sphere. Great attention is also focused on ensuring our tasks in resolving the targeted projects of basic research. Of the 19 state-targeted projects of basic research which have been formulated by the CSAV, the SAV is responsible for 6. These are, for example, robot technology processing systems, complex utilization of lignocellulose raw materials, phytomass, integrated protection of plants, ecological optimization in the use of the East Slovak lowlands, and others.

Much effort is needed to build an implementation base in some of the SAV installations which would enable us to ensure a high degree of availability of scientific findings and their application in industry. For example, we are restructuring the SAV Institute for Technical Cybernetics into a scientific production unit, creating conditions for experimental production in the SAV Center for Electrophysical Research, Center for Chemical Research, and the Institute for Molecular Biology...

We also assign great significance to the establishment of detached sections of our worksites in certain production enterprises, for example, in the Piestany Tesla and the Martin ZTS. We are getting ready to master

the tasks which will be assigned the SAV in the elaboration of long-term prognoses of scientific and technological development in our society.

Even a Virus Can Be Tamed

The SAV Virological Institute was first established on a statewide basis and was part of the CSAV. Following the institution of the Czechoslovak federation, it became part of the SAV. It is one of its largest institutes with 200 employees, of which 60 hold university degrees. There are 8 doctors of sciences, 26 candidates of sciences, 2 professors, 1 academician, 2 CSAV and SAV corresponding members and several candidate members. We discussed the mission and work of the institute with its director, Prof Ladislav Borecky, corresponding member of both academies.

"Even at the time our institute was established, antibiotics were known as an effective treatment of diseases stemming from infectious agents (bacteria or mildew). Our institute focused on viruses which in peoples' subconscious are known as infectious agents. There are a great many of these and can cause 500 different ailments in a human organism. However, they also attack animals and plants in the same manner as other infectious agents. The first to discover the virus was a Russian scientist Ivanovski while studying diseased tobacco leaves.

"The virus is basically genetic material which only comes to life in a cell from which it receives its information code. We study the viruses, since if we intend to fight against something, we must get to know it first.

"Here we encounter great problems in searching for antidotes. So far, we must admit that an effective one has not yet been found. The problem is not unlike that encountered in the search for medication against tumors. Since, as we already mentioned, a virus only comes to life through contact with a cell, the main problem at this point is how to destroy the virus without destroying the cell as well. A certain degree of success was achieved at our institute in tests with interferon, which is a powerful cell regulator. In its study, there have been some advances. We were among the first to acquire it in a highly purified form and we were also able to ascertain that in cancer in animals, one of the first substances formed is interferon. Moreover, some success has been achieved with dual-fiber ribonucleous acid which causes the formation of interferon in a patient.

"The virus research enabled us to develop most modern directions in biology, molecular biology, and their study helped us to understand genetic regulation.

"Our institute conducts basic research which, as is common knowledge, does not produce rapid, palpable results. Nevertheless, what we have discovered is known throughout the world. We have advanced not only in theory but also in practice. Of great merit is, for example, the testing of medications, or the ecological research of viruses. We have prepared

a map showing the appearance of viruses transported into Slovakia by caterpillars. We have two worksites which actually assist us in practice. They are the chair of virology and microbiology of the school of natural sciences at Komensky University [UK], which breeds 'virus young,' and a joint worksite for research in vironeuroses, with the participation of the school of medicine at UK, the City Institute for National Health in Bratislava, and our institute. The results of this joint research reach directly into the sphere of health care. We even have contacts with the medical schools, breeding stations and other research institutions. Moreover, within the institute we have three reference centers of the WHO which have an educational mission. One is for rickets-type diseases, the second for encephalitis, and the third for research of viral etiology of psychic diseases.

"Relatively new is the section for medical virology. It has been in existence only 2 years as part of the Infectious and Parasitic Diseases Clinic of the UK Medical School in Bratislava. It undertakes research of neuroviruses and assists in diagnosing certain rare diseases. In addition, we have a laboratory of comparative virology which studies the relationship between viruses in humans and animals. This worksite is headed by Academician Dionys Blaskovic.

"By the end of the 5-year plan, we should have a new institute. Housing problems should not be an obstacle in continuing the important research work in this rapidly developing branch of biology."

A Place of Deep Secrets

The hallway of the SAV Physics Institute in Bratislava leaves a strange, if not icy impression. Locked in by a gate at each end and creating an eerie feeling of long-term refrigeration of life which one encounters in science-fiction literature, it leads to the office door of a dedicated scientist, Eng Pavol Duhaj, Candidate of Sciences. He greeted us with a friendly smile and immediately took us quite willingly to a laboratory which has an aura of magic about it, the laboratory of amorphous metal alloys.

Their advantage is that they can be shaped in molten state into strips of different width and thickness for now, several hundred, in the future perhaps several thousand meters. This technology significantly reduces production cost in comparison with the classical method of using materials in which it was necessary to melt the metal, pour it off in a casting and then roll it several times. Amorphous metals have special physical properties, especially magnetic and mechanical, and are also rust resistant. What exactly do we need them for? In the electrotechnical industry they are used as nuclei of transformers, recorder heads, magnetic tape and many other types of equipment. With the new technology it is possible to produce hard braziers at temperatures of about 900 degrees Celsius. They are very tough and rust resistant. Up to now, brazing of the necessary chemical composition could be done only in the form of a powder. With the technology of rapid cooling, such brazing of the desired composition can be accomplished in the form of strips, which is much better

for the brazing technology. "It is only too bad we cannot find a producer for them in this country. Even though we would be willing to help any production enterprise at the beginning, it looks as though we will have to manufacture them ourselves right here at this worksite." This, as he was saying goodbye to us, from Engineer Duhaj, leader of a three-member collective of scientists who have recently been awarded a SAV prize precisely for advancing production technology and research of the physical properties of amorphous metal materials.

The Physics Institute which we have just seen is part of the SAV Center for Electrophysics Research which also incorporates the Electrotechnical Institute and the Institute for Measurement and Measuring Technology. The center began its work on 1 January 1981 and focuses on the realization of scientific programs important for developing knowledge but also for social development, especially with respect to practical application of this knowledge in production. The scientific performance capacity of the center was concentrated on a rather small area of scientific problems in three focal spheres, namely, research on new materials, structures and elements for microelectronics and optoelectronics, research in amorphous alloys and ultrahigh-conductivity materials, and finally automation of scientific experiments.

The center is setting up an implementation section which will produce unique materials, electronic elements and equipment. We should mention small series and unit production of optoelectrical linkage elements, the Hall probes, ultrahigh-conductivity quantum magnetometer, magnetometer with the Hall probe, samples of the already mentioned amorphous metal alloys, a feeder generator for plasma chemical technology... Most of the achievements have been made possible thanks to a highly developed initiative of the workers and brigades of socialist labor which should be considered an important factor in the performance of the center's institutes.

Assessment of the work and basic concepts of the CSAV has been included in reports of party congresses from the 14th to the 16th. The role of science is, of course, also understood by the leading experts in the field themselves, as expressed in the following statement: "Strategy of its development has ceased to be a specific side issue, on the contrary, it has become one of the determining factors in the future development of our society."

The entry of our science in the integration process of the socialist countries has also been dealt with by CPCZ General Secretary Gustav Husak who stated the following from the platform of the 16th CPCZ Congress: "International cooperation in science, especially with Soviet scientists, has brought us significant successes. In this connection, we should recall at least cosmic and nuclear research, research in molecular genetics, as well as the effort to bring theoretical treatment of the experiences from the struggle for real socialism closer to the people.

"Despite unquestionable achievements, we must note that the rate of progress and practical application of science does not reflect the needs which confront us. Little has been done to date toward the concentration of forces in resolving the key problems of our society.

"Scientific research must be still more emphatically oriented toward acquisition of fresh resources for our energy needs, for better utilization of the raw-material base, and valorization of materials suitable for electronics, cybernetics, robot technology, probing biological technologies, enhancing the fertility of the soil and utility of farm animals, and for the protection of the environment.

"Among the most important tasks in the sphere of social sciences in the next 5-year plan will be the examination of the timely problem of the building of a developed socialist society in Czechoslovakia. The advances in social sciences cannot do without creative discussion in a critical atmosphere, without bold probing of the new, and especially without a principled party approach.

"Practical experience has shown that it is most essential to assess the present system of management in science and technology. Elaboration of a system which ensures a unified national policy in the sphere of science and technology will lead to a much-needed more intensified linkage of science and production, and will raise our scientific and technological base to a higher level."

9496

CSO: 2402/13

CZECHOSLOVAKIA

CZECHOSLOVAK ACADEMY OF SCIENCES DESCRIBED

Prague DOKUMENTACNI PREHLED in Czech 13 Sep 82 pp F1-F6

[Article: "Organization: Czechoslovak Academy of Sciences"]

[Text] Headquarters

Prague

Status

The Czechoslovak Academy of Sciences [CSAV] is the highest scientific institution in the Czechoslovak Socialist Republic; it develops research activity in its scientific centers and brings together foremost scientific workers as its members. It was established under Law No 52/1952 of SBIRKA dated 29 October 1952 which became effective 12 November 1952. The law on the CSAV has been amended several times. Law No 53/1957 of SBIRKA dated 31 October 1957 gave the CSAV new duties and authority. According to the amended law, the CSAV Seventh General Assembly adopted the CSAV bylaws setting up in detail its internal relations. Changes in the state, especially following adoption of the new socialist constitution, required another amendment of the CSAV law, specifically Law No 54/1963 of 9 July 1963. This law was supplemented by legal measure No 26/1970 of SBIRKA of the CSSR Federal Assembly Presidium on 19 March 1970. The last amendment of the law took place in 1977. On 15 December 1977, Law No 91/1977 of SBIRKA on the Czechoslovak Academy of Sciences was promulgated and it is the fundamental legal thesis of the CSAV.

Operations

The chief functions of the CSAV are research work and managing and coordinating activity in basic research. The CSAV produces overall concepts of development of science in Czechoslovakia in accordance with the requirements of the expanding socialist society. On the highest level, it develops scientific research activity on the most important prospective economic and social projects in the natural, social and technical sciences. It concentrates on coordinating the scientific and methodological activities of all scientific work centers and universities in the area of basic

research. It seeks out and trains highly qualified science workers for the requirements of scientific work centers and for practical needs, especially in cooperation with universities. It publishes the results of its activities and helps popularize the results of scientific research. The CSAV is the chief representative of Czechoslovak science abroad. It organizes and coordinates scientific relations with academies of science and similar institutions abroad, especially with the academies of science of socialist countries. In basic scientific questions, the CSAV is the chief adviser and coordinator of party and government bodies. It prepares the proposal for long-range research programs of Czechoslovak science and also proposals of statewide plans of fundamental scientific research activity and monitors fulfillment of these plans. The scientific activity of the CSAV is coordinated with the national plan of basic research, which is a constituent part of the national plan for science and technology approved by the CSSR Government. The Government of the CSSR has entrusted the CSAV with the elaboration of these basic research programs and thereby the CSAV took over the role of responsible guarantor for the entire field of basic research. The national programs of basic research encompass in their subject matter most of the areas of basic research (I. Physical properties of matter, its structure, methods of current mathematics; II. The cosmic world, the Earth and utilization of its resources; III. New theoretical bases of technology; IV. New chemical processes, their control and technology; V. Structure and function of organic matter; VI. Man and the biosphere; VII. Biological and medical sciences, healthy development of man; VIII. Socialist society during the scientific-technical revolution).

Czechoslovak scientific work centers have achieved many significant results which have been recognized and appreciated home and abroad. For example, the CSSR achieved world standard results in research on semiconductors and magnetic and dialytic substances. Research in the field of cosmic technology brought about valuable results under the Interkosmos international program. In astronomy as well, significant theoretical results were achieved in research on solar activity, interplanetary matter and explaining the physical processes in the interior of stars. In the field of macromolecular chemistry, developments in hydrophilic gels mean overcoming conservatism in the application of synthetic substances in medicine. Among the most important results achieved in biochemistry, the preparation of analogs of neurohypophysial hormones must be mentioned. The main genetic system of transplant toleration in man was discovered and the evidence of its similarity to corresponding systems in other kinds of animals, including common laboratory ones. The results from this kind of special biological work were especially helpful in the area of helminthological and parasitological research in our veterinary and agricultural practices. Unusual results were achieved recently in the field of molecular biology and genetic engineering. We also gained important results in the area of the social sciences and historical sciences. Many of the results achieved in CSAV work centers were developed and applied directly in social practices.

To further develop basic research the cooperation and mutual assistance among research centers of the academies of socialist countries is very important, especially cooperation of the CSAV with the USSR Academy of Sciences. The cooperation of the CSAV and its work centers in scientific programs within CEMA is increasingly important. The CSAV is optimally involved with the process of socialist integration in science and it utilizes its foreign contacts for close cooperation in the long-term plans of research and development in the countries of the socialist community. It also cooperates with many scientific institutions in developed capitalist nations. The CSAV is an active member in international governmental and nongovernmental organizations. Its work, for example, with the scientific programs of UNESCO is important. The CSAV is also involved in the programs and operations of the WHO.

History

The CSAV is part of the progressive tradition of Czech and Slovak science. It emerged in the awakening of national scientific institutions, that is, the Royal Czech Society of Learning, the Czech Academy of Science and Arts, the Slovak Matica [Cultural Institute] and the Slovak Academy of Science and Arts. The Royal Czech Society of Learning was the oldest scientific society in Bohemia. It was established in the years 1770-1771 originally as the Private Society of Learning. In 1784, it attained public recognition through a court decree and was named the Czech Society of Learning. In 1790, it took the name Royal Czech Society of Learning. Its objective was to arrange meetings with lectures and with experimental exhibits of the work of members, offer awards for dissertations on designated topics, give reviews and publish scientific works.

The Czech Academy of Science and Arts was established in 1890 from a financial gift of the architect J. Hlavka. Its purpose was to support scientific activity, watch over the Czech language and literature and improve the domestic arts, disseminate works in the Czech language and also the results of scientific, literary and artistic works published in other languages.

In bourgeois Czechoslovakia, the scientific base was fragmented and uncoordinated and without any significant state support. Basic research was associated with industrial enterprises and their requirements. Only with establishment of the people's democratic state did science begin to develop in the interests of the national economy and all of society. The era of building the foundations of socialism brought new opportunities for the development of science in Czechoslovakia, in fact it was placed before new tasks which the national economy and social practices imposed. In addition, it took on the responsibility of catching up with global scientific-technical advances both quantitatively and qualitatively and securing a place for Czechoslovak science commensurate with the development of our productive forces and traditions of scientific investigation. There arose the need to build scientific institutions of modern types, institutions with scientifically planned research, assured of interdepartmental cooperation and closely connected with the work centers of applied research and procedures. Thus emerged the Czechoslovak Academy of Sciences based on the law of 29 October 1952. At its establishment many older

scientific institutions, institutes, foundations and endowments were incorporated with it (especially seven centralized natural scientific institutes: biological, chemical, physical, geological, mathematical, polarographical and astronomical and also the Slavic Institute, the Oriental Institute and others), and at the same time the CSAV began to set up its own network of new work centers for basic scientific research. In 1953, an analogous institution originated in Slovakia--the Slovak Academy of Sciences (SAV). In the interests of consolidating the organization and management of all science in Czechoslovakia, in 1960 the SAV was also organically incorporated into the CSAV and so became--while retaining its name--an integral part of the CSAV.

Structure

The general assembly of CSAV members is the supreme organ of the CSAV. It makes decisions on basic organizational questions, determines the main directions of CSAV activity and its future development. As proposed by the CSAV presidium, it elects members to the CSAV and the members of the CSAV presidium (the presidium submits results of the elections as proposals to the CSSR Government). The general assembly meets as a rule once a year; the CSAV presidium convenes it.

The CSAV president stands at the head of the CSAV. The president of the CSSR, on the proposal of the government, appoints him from the ranks of the academicians and recalls him. The president of the CSAV consistently oversees fulfillment of the CSAV objectives; he is responsible for performance of his duties to the CSSR Government.

The CSAV presidium is the central managing body of the CSAV. The presidium is responsible to the CSSR Government for operation of the CSAV. The members of the presidium are the CSAV president, the CSAV vice presidents, other presidium members and the CSAV scientific secretary. The presidium members are appointed and recalled by the CSSR Government, as a rule on the basis of election by members of the CSAV general assembly. The term of office of the presidium is 5 years.

CSAV president	Academician Bohumil Kvasil
CSAV vice presidents	Academician Vladimir Hajko Academician Vladimir Pokorny Academician Premysl Rys Academician Josef Riman Academician Zdenek Snitil

The basic ideological and scientific bodies of the CSAV for individual scientific subjects are the scientific collegia of the CSAV. Centers for scientific research activities of the CSAV are their scientific work centers.

The CSAV objectives in the administrative-managerial and organizational area are provided by the CSAV staff.

Membership

Members of the CSAV are appointed by the CSSR Government on the basis of elections, as a rule, which are conducted by the general assembly of the CSAV membership or on proposals of the CSAV presidium. Membership in the CSAV consists of line member-academicians, corresponding members and foreign and honorary members.

8491

CSO: 2402/10

POLAND

RESEARCH-DEVELOPMENT PROCESS, PROGRAMS OUTLINED

Organization of Process

Warsaw NAUKA POLSKA in Polish No 11-12, Nov-Dec 81 /Insert/

[Text] Table 1. Organization of the Research and Development Process In
The GIG [Main Institute of Mining]

Key:

1. Classification of work and its results (products)
2. Group
3. Examination
4. Determination
5. Utility
6. Dissemination
7. Science-Service
8. Class
9. Determining its features or state
10. Determining new phenomena or dependence
11. Synthesis and generalizing knowledge
12. Test bench

1 Klasyfikacja prac i ich wyników (produktów)*				94 Rodzaje dokum.	
2 GRUPA	8 KLASA	28 RODZAJ	58 STADIUM ROZWOJU	FAZA B1 77	95 FAZA B2 przygotowanie produktu
				Rozpoznanie i opracowanie metryki produktu	B2/1 — przygotowanie projektowo-konstrukcyjne umożliwiające rozpoczęcie właściwych prac wykonawczych produktu
1 ROZPOZNAW. CZE	0	0 59 60	1 Stadium wstępne 2 Stadium końcowe	01 Różne dokumentacje wewnętrzne obejmujące wyniki rozpoznania oraz wstępnych lub uzupełniających badań. 78 Koncepcja produktu (modyfikacja koncepcji)	96 —
2 POZNAWCZE	9 Określenie cech lub stanu 2 Określenie nowych zjawisk lub zależności 10 3 Synteza i uogólnienie wiedzy	0	0		97 Dokumentacje wewnętrzne ujmujące wyniki prac nad kompletowaniem aparatury i przygotowaniem instalacji 04 Dokumentacje wewnętrzne ujmujące wyniki wykonanych prac pomiarowych i analitycznych (bez dokumentacji stoisk i wyposażenia, które stanowi odrębny produkt GIG) 98 03 Dokumentacje wewnętrzne (pomocnicze) z prac teoretycznych, analiz literaturowych, statystycznych itp. 99
3	1 Stoiska badawcze 12	1 Moduł stoiska 29 2 Stoisko 30 3 Zespół stoisk 31	0		100 03 Założenia funkcjonalne i konstrukcyjne wraz z metodyką badawczą i pomiarową 101 04 Uproszczona dokumentacja stoiska (wykonawcza)
	2 Urządzenia 13	32 1 Elementy wyposażenia 33 2 Aparatura użytkowa 34 3 Wyposażenie ciągów technologicznych 35 4 Wyposażenie pomocnicze	61 1 Model względnie konstrukcja dośw. 2 Prototyp 62 63 3 Seria-informacyjna 64 4 Seria przemysłowa		102 03 Uproszczona dokumentacja konstrukcyjna modelu względnie konstrukcji doświadczalnej 103 03 Założenia konstrukcyjne i projekt wstępny prototypu 104 04 Arkusz oceny założeń prototypu** 105 03 Dokumentacja techniczno-warsztatowa prototypu
5 UTYLITARNE	3 Technologie wytwarzania 14	1 Technologie/sposoby wytwarzania mechaniczne 36 37 2 Technologie/sposoby wytwarzania chemiczne 38 3 Technologie/sposoby wytwarzania przeróbki mechanicznej 38 4 Technologie/sposoby inne 39	65 1 Skala laboratoryjna 66 2 Skala doświadczalna 67 3 Skala półprzemysłowa 68 4 Skala przemysłowa	80 02 Metryka produktu użytkowego lub pomocniczego (aktualizacja metryki)	107 03 Uproszczony projekt instalacji i badań laboratoryjnych 108 03 Założenia technologiczne dla instalacji i badań w skali doświadczalnej 108 109 04 Projekt instalacji doświadczalnej 109 110 03 Założenia technologiczne dla projektu procesowego i instalacji w skali półprzemysłowej (ewent. przemysł.) 111 04 Projekt procesowy dla instalacji półprzemysłowej 112 05 ZTE instalacji półprzemysłowej*** 113 06 Projekt techniczny instalacji półprzemysłowej
	4 Sposoby wytwarzania 15				
	5 Technologie górnicze 16	1 Technologie eksploatacji 40 2 Procesy/sposoby górnicze 41	69 1 Wersja doświadczalna 70 2 Wersja półprzemysłowa 71 3 Wersja przemysłowa	81 Umowa wdrożeniowa (wyprzedzająca)	114 03 Projekt technologii eksploatacji lub procesu/sposobu górniczego w wersji doświadczalnej 115 03 Projekt techniczny technologii eksploatacji lub procesu/sposobu górniczego, wersja półprzemysłowa
	6 Programy/przedsięwzięcia techniczno-organizacyjne 17	42 1 Programy techniczno-organizacyjne 2 Przedsięwzięcia techniczno-organizacyjne 43	72 1 Wersja wstępna 72 73 2 Wersja do realizacji 73		143 03 Założenia i projekt wstępny programu/przedsięwzięcia techniczno-organizacyjnego 116
	7 Metody 18	1 Metody pomiaru 44 2 Metody analizy 45 46 3 Metody postępowania	74 1 Wersja wstępna 72 75 2 Wersja użytkowa 74	117	03 Założenia i projekt wstępny metody
	8 Oprogramowanie komputerowe 19	1 Program 47 2 Pakiet programów 48 3 System komputerowy 49	69 1 Wersja doświadczalna 71 2 Wersja przemysłowa	118	03 Założenia i projekt wstępny systemu komputerowego przetwarzania danych
4 UPOWSZECZNIA	1 Informacje 20	1 Sprawozdania, krótkie informacje 50 2 Raporty 51	0	82 01 Sprawozdania i informacje wewnętrzne (z wyjątkiem „Informacji o wyniku pracy badawczej”)	
	2 Publikacje 21	1 Publikacje drobne, popularyzatorskie 52 2 Publikacje większe 53 3 Książki i skrypty 54	75 1 Wersja przejściowa 76 2 Wersja końcowa 75 3 Wersja przejściowa	83 01 Duże sprawozdania problemowe o stanie techniki, stanie wiedzy itp. o zasięgu branżowym 84 01 Krótkie artykuły informacyjne, komunikaty w biuletynach GIG, Annual Report i inne	
6	3 Akty normatywne 22	1 Katalog, poradnik 55 2 Przepis, norma 56 3 Projekt typowy 57	76 2 Wersja przejściowa 76 3 Wersja końcowa	85 01 Komunikaty GIG, obszerne referaty na kongresy międzynarodowe lub duże konferencje, i 86 01 Prace monograficzne ujmujące dziedzinowe wyniki badań GIG, podręczniki, materiały szkoleniowe 87 01 Katalog systemów wybierania, katalog obudowy, poradnik metod zwalczania zagrożenia, i 88 01 Przepisy wydane przez resort lub Wyższy Urząd Górniczy, norma branżowa, norma państwowa 89 01 Projekt typowy wg zakresu tematycznego przewidzianego dla GIG Zarządzeniem nr 27 Mi 90 01 Dokumentacja jednostkowego rozwiązania projektowo-technicznego	
5 NAUKOWO-USŁUGOWE	1 Jednostkowe rozwiązania proj.-techn. 23	0	0	91 01 Ocena jakości wyrobu, analiza jakości itp.	
7	2 Ocena jakości wyrobu, analiza jakości 24	0	0	92 01 Attest, legalizacja, orzeczenie, protokół badań	
	3 Attest, legalizacja, orzeczenie 25	0	0	93 01 Opinia, ekspertyza	
	4 Opinia lub ekspertyza naukowo-techniczna 26	0	0		

27 A. Lisowski: Systemowa organizacja prac naukowo-badawczych i ocena ich ekonomicznej efektywności, „Nauka Polska” 1981 r. 11—12.

instalacji przewidziane dla poszczególnych stadiów i faz procesu badań i rozwoju*

do fazy sprawdzenia w warunkach przemysłowych

B2/2 — właściwe prace wykonawcze doprowadzające do powstania produktu oraz badania 119 umożliwiające wprowadzenie go do fazy R

—

05 Dokumentację ujmującą wyniki badań przygotowane w formie dostosowanej do merytorycznej charakterystyki produkcji i sprzyjającej ich praktycznemu wykorzystaniu (bez fazy R) np. prace monograficzne o rozpoznaniu złóż, prace doktorskie lub równoważne itp. 120

04 Dokumentację ujmującą wyniki badań przygotowane w formie sprzyjającej upowszechnieniu opracowywanego uogólnienia wiedzy (bez fazy R) w tym maszynopisy przygotowujących monografię, skryptów, prace habilitacyjne itp. 121

05 Dokumentacja techniczno-rzeczna stoiska (powykonawcza) 122
06 Instrukcja obsługi i użytkowania stoiska 123
07 Protokół odbioru warsztatowego 124

04 Wyniki prób i badań modelu względnie konstrukcji doświadczalnej 125

06 Dokumentacja techniczno-warsztatowa powykonawcza (kopia z poprawkami naniesionymi w czasie wykonywania prototypu) 126
07 Instrukcja użytkowania i obsługi prototypu (korygowana po fazie R) 127
08 Protokół odbioru prototypu wraz z wynikami rozruchu warsztatowego i decyzją o dopuszczeniu do fazy R 128

04 Dokumentacja techniczno-warsztatowa powykonawcza (kopia z poprawkami naniesionymi w czasie wykonywania serii informacyjnej) 129
05 Instrukcja użytkowania i obsługi serii informacyjnej wyrobu 130

03 Dokumentacja techniczno-warsztatowa serii przemysłowej 131
04 Instrukcja użytkowania i obsługi serii przemysłowej 132

04 Wyniki badań w skali laboratoryjnej i ich analiza (wraz z ewentualną koncepcją technologiczną) 133

05 Analiza i opracowanie wyników badań w skali doświadczalnej 134

07 Protokół odbioru instalacji półprzemysłowej wraz z wynikami rozruchu i decyzją o dopuszczeniu do fazy R 135

03 Założenia technologiczne dla projektu procesowego instalacji przemysłowej (zakładu) 136
04 Projekt procesowy dla instalacji przemysłowej 137
05 ZTE instalacji przemysłowej (zakładu) 138
06 Projekt techniczny instalacji przemysłowej 139

04 Dokumentacja wykonawcza przygotowująca próby serii doświadczalnej 140

04 Dokumentacja dopuszczeniowa technologii eksploatacji lub procesu/sposobu górniczego w wersji półprzemysłowej 141

03 Projekt technologii eksploatacji lub procesu/sposobu górniczego w wersji przemysłowej (opis wraz z instrukcją stosowania) 142
04 Dokumentacja dopuszczeniowa technologii eksploatacji lub procesu/sposobu górniczego

04 Projekt techniczny programu/przedsięwzięcia techniczno-organizacyjnego wraz z zasadami i instrukcją realizacji — wersja do fazy R 144

04 Opis metody wraz z wytycznymi/instrukcją stosowania — wersja do fazy R 145

146
04 Dokumenty źródłowe wraz z instrukcją ich sporządzania i korygowania — wersja do fazy R 146
05 Organizacja i schemat przetwarzania (charakterystyka zbiorów i algorytmy) 147
06 Dokumentacja oprogramowania komputerowego wraz z wynikami testowania i instrukcją eksploatacji — wersja do fazy R 148
07 Arkusze wynikowe wraz z zasadami tworzenia i wykorzystania — wersja do fazy R 149

c)

i lub szerszym

artykuły problemowe w czasopiśmie itp.

okładowe o charakterystyce skryptu

itp.

twowa itp.

Ministerstwo Górnictwa z dn. 25.09.1979 (Znak In-BP/1494)

** — tylko w przypadkach określonych Zarządzeniem nr 21 Ministra Górnictwa z dnia 31.07.1979 r. (Znak EM 9) 356/79 150

*** — jeżeli są wynagradzane przez inwestora 151

FAZA R — Sprawdzenie produktu w warunkach przemysłowego stosowania (lub w warunkach ewidentnych) oraz uzyskanie oceny i dopuszczeń warunkujących wdrożenia 152

—

—

—

08 Wyniki rozruchu i próbnej eksploatacji 153
09 Informacja o wyniku pracy badawczej 154

—

09 Wyniki badania prototypu w fazie R w warunkach przemysłowych 155
10 Dokumentacja techniczno-warsztatowa prototypu (z poprawkami na kopii naniesionymi w wyniku fazy R) 156
11 Arkusz oceny wyrobu (produktu)** 157
Umowa wdrożeniowa 158

06 Wyniki badania serii informacyjnej w warunkach przemysłowych 159
07 Dokumentacja techniczno-warsztatowa serii informacyjnej (kopia z poprawkami naniesionymi po badaniach przemysłowych) 160
08 Arkusz oceny wyrobu dla dopuszczenia do produkcji przemysłowej 161
09 Informacja o wyniku pracy badawczej 154
Umowa wdrożeniowa 158

05 Protokół uruchomienia produkcji przemysłowej 162
Umowa wdrożeniowa 158

—

06 Dokumentacja cech jakościowych technologii i wyrobu w skali doświadczalnej 163
Umowa wdrożeniowa 158

08 Powykonawczy projekt techniczny instalacji półprzemysłowej 164
09 Projekt procesowy w skali półprzemysłowej w fazie R 165
10 Wymagania techniczne produktu 166
11 Informacja o wyniku pracy badawczej 154
Umowa wdrożeniowa 158

07 Analiza i opracowanie wyników fazy rozwoju procesu technologicznego skali przemysłowej wraz z dokumentacją zmian w procesie i instalacji 167
08 Wymagania techniczne produktu w skali przemysłowej 168
09 Opis techniczny procesu w skali przemysłowej 169
10 Protokół uruchomienia produkcji przemysłowej 162
Umowa wdrożeniowa 158

09 Wyniki prób wersji doświadczalnej, technologia eksploatacji lub procesu/sposobu górniczego wraz z ewentualną koncepcją nowego wyposażenia technicznego 170

05 Wyniki stosowania w fazie R (technologii eksploatacji lub procesu) sposobu górniczego w wersji półprzemysłowej wraz z oceną 171
06 Informacja o wyniku pracy badawczej 154
Umowa wdrożeniowa 158

05 Wyniki przemysłowego stosowania w fazie R (technologii eksploatacji lub procesu) sposobu górniczego 172
Umowa wdrożeniowa 158

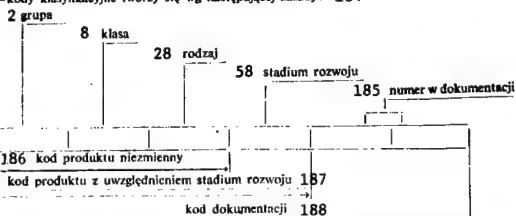
05 Wyniki przemysłowej weryfikacji programu/przedsięwzięcia techniczno-organizacyjnego wraz z jego oceną 173
06 Projekt programu/przedsięwzięcia techniczno-organizacyjnego wraz z zasadami i instrukcją stosowania 174
07 Informacja o wyniku pracy badawczej 154
Umowa wdrożeniowa 158

05 Wyniki stosowania metody wraz z jej oceną po fazie R 175
06 Opis metody wraz z wytycznymi/instrukcją stosowania po weryfikacji w fazie R 176
07 Informacja o wyniku pracy badawczej 154
Umowa wdrożeniowa 158

08 Dokumenty źródłowe wraz z instrukcją sporządzania i korygowania po weryfikacji w fazie R 177
09 Dokumentacja oprogramowania komputerowego wraz z wynikami testów przemysłowych i instrukcją stosowania po weryfikacji w fazie R 178
10 Arkusze wynikowe wraz z zasadami tworzenia i wykorzystania po weryfikacji 179
11 Technologia przetwarzania w ośrodkach obliczeniowych 180
12 Informacja o wyniku pracy badawczej 154
Umowa wdrożeniowa 158

Oznaczenia 181

* — liczby arabskie oznaczają elementy klasyfikacyjnego kodu produktów i dokumentacji 182
— symbol „0” przyporządkowany niektórym polom tablicy klasyfikacyjnej oznacza, że cechy określone tymi polami nie są identyfikowane 183
— kody klasyfikacyjne tworzy się wg następującej zasady: 184



Przykłady tworzenia kodu: 189

Produkt zaliczony do grupy 3 w tym klasa 2 rodzaj 3 stadium rozwoju 4 otrzymuje kod niezmienny 3 2 3

kod z uwzględnieniem stadium rozwoju 3 2 3 4

190 Dokumentacja dla tego produktu wykonana w fazie B2/2 wymieniona pod numerem 04 otrzymuje kod 3 2 3 4 04

13. Equipment
14. Manufacturing technology
15. Production methods
16. Mining technology
17. Technical-Organizational programs/projects
18. Methods
19. Computer software
20. Information
21. Publications
22. Standards
23. Singular design-technical solutions
24. Evaluation of product quality, analysis of quality
25. Attestation, legalization, judgment
26. Opinion or professional scientific-technical report
27. Lisowski: "Systematic Organization of Scientific Research Work and an Evaluation of Its Economic Effectiveness," NAUKA POLSKA, 1981, pp 11-12
28. Type
29. Stand module
30. Stand
31. Group of stands
32. Equipment components
33. Useful apparatus
34. Production flow-lines equipment
35. Auxiliary equipment
36. Technology/methods of mechanical production
37. Technology/methods of chemical production
38. Technology/methods of mechanical modifications
39. Other technology/methods
40. Technology of exploitation
41. Mining processes/methods
42. Technical-organizational programs
43. Technical-organizational projects
44. Measuring methods
45. Methods of analysis
46. Methods of procedure
47. Program
48. Packet of programs
49. Computer system
50. Reports, short references
51. Reports
52. Small publications, popularizing publications
53. Larger publications
54. Books and scripts
55. Catalogs, handbook
56. Regulations, standards
57. Typical project
58. Stage of development
59. Initial stage
60. Final stage
61. Model relative to experimental design

62. Prototype
63. Series-informational
64. Industrial series
65. Laboratory scale
66. Experimental scale
67. Semi-industrial scale
68. Industrial scale
69. Experimental version
70. Semi-industrial version
71. Industrial version
72. Initial version
73. Version to be implemented
74. Useful version
75. Interim version
76. Final version
77. Phase B1--Examination and preparation of product specifications
78. Various internal documentation showing examination results and initial or supplemental research
79. Product conception (concept modification)
80. Specifications of a utility or determination product (actualizing specifications)
81. Contract for application (leadtime)
82. Reports and internal information (except "Information Concerning Research Work")
83. Large problem-type reports on the state of technology, know-how and so forth on a branch or wider scale
84. Short informational articles and announcements in GIG bulletins, annual reports and others
85. GIG announcements, comprehensive papers at international congresses or large conferences, problem-type articles in magazines
86. Monographs encompassing GIG research results for various branches, textbooks, script-type training material
87. Catalog of selection systems, housing catalog, handbook of methods to combat threats and the like
88. Regulations issued by the ministry or the Higher Mining Office, branch standards, state standards and the like
89. Standard project according to thematic range projected by the GIG by Order No 27 of the Ministry of Mining of 25 September 1979 (seal In-BP/1494)
90. Documentation of individual design-technical solutions
91. Evaluation of product quality, analysis of quality and so forth
92. Attestation, legalization, judgment, research protocols
93. Opinions, professional report
94. Phase B2--Preparation of product for phase testing under industrial conditions.
96. Design-construction preparations permitting the initiation of suitable executory work on the product
97. Internal documentation encompassing work results on completing the apparatus and preparing the installation

98. Internal documentation encompassing results of executed measurement and analytic work (without equipment and test-stand documentation which is a separate GIG product)
99. Internal documentation (ancillary) of theoretical work, literature and theoretical analyses and the like
100. Functional and design principles together with research and measuring methodology
101. Simplified bench documentation (work)
102. Simplified design documentation of the model with regard to experimental design
103. Design and construction assumptions of the first prototype
104. Sheet on the evaluation of prototype assumptions
105. Technical-workshop documentation of prototype
106. Technical-workshop documentation of informational series
107. Simplified installation design and laboratory research
108. Technological assumptions for the installation and research on an experimental scale
109. Experimental installation design
110. Technological assumptions for the processing and installation design on a semi-industrial scale (possibly industrial scale)
111. Process design for semi-industrial installation
112. ZTE [Technical-Economic Guidelines] semi-industrial installation
113. Technical design of semi-industrial installation
114. Design of operation technology or mining process/method, experimental version
115. Design of operation technology or mining process/method, semi-industrial version
116. Assumptions and initial design of technical/organizational program/ project
117. Assumptions and initial design of methods
118. Assumptions and initial design of data processing system
119. Actual completion work leading to the creation of a product and research leading it to phase R [development]
120. Documentation encompassing research results prepared in a form suitable for the essential production characteristics and promoting their practical use (without phase R), for example, monographs on survey of deposits, doctoral or equivalent work and the like
121. Documentation encompassing research results prepared in a form to promote the dissemination of the prepared generalizations of know-how (without phase R), including typewritten monographs, scripts, assistant professorship theses and the like
122. Technical-working documentation for the bench (postcompletion)
123. Instructions for servicing and using the bench
124. Protocol for receipt of workshop
125. Results of tests and investigations of model relative to experimental design
126. Postcompletion technical-workshop documentation (copy with corrections written in while completing the prototype)

127. Instructions for using and servicing the prototype (corrected after phase R)
128. Protocol for the receipt of the prototype together with the workshop startup and decision regarding admittance to phase R
129. Postcompletion technical-workshop documentation (copy corrections written in while completing the informational series)
130. Instructions for using and servicing the product's informational series
131. Technical-workshop documentation for the industrial series
132. Instructions for using and servicing the industrial series
133. Results of research on a laboratory scale and their analyses (together with a conceivable technological concept)
134. Analysis and preparation of results of research on an experimental scale
135. Protocol for the receipt of a semi-industrial installation together with startup results and decision regarding admittance to phase R
136. Technological assumptions for the process design for an industrial installation (plant)
137. Process design for industrial installation
138. ZTE industrial installation (plant)
139. Technical design for industrial installation
140. Working documentation to prepare tests of the experimental series
141. Admittance documentation for operation technology or mining process/method, nonindustrial version
142. Design of operation technology or mining process/method for the industrial version (description and application instructions)
143. Admittance documentation for operation technology or mining process/method
144. Technical design for technical-organizational program/project together with implementation principles and instructions--version up to phase R
145. Description of methods together with application guidelines/instructions--version up to phase R
146. Source documents together with instructions for their verification and correction--version up to phase R
147. Processing organization and scheme (characteristics of files and algorithms)
148. Computer software documentation together with test results and operating instructions--up to phase R
149. Results sheets together with principles of production and use--up to phase R
150. Only for the cases designated in Order No 21 of the Ministry of Mining of 31 July 1979 (mark EM9) 3564/79
151. If paid for by the investor
152. Phase R--Verifying the product under industrial application conditions (or under evidence conditions) and obtaining evaluations and allowances conditioning applications
153. Startup and trial operation results

154. Information on research work results
155. Results of researching prototype in phase R under industrial conditions
156. Technical-workshop documentation for prototype (with correction on copy resulting from phase R)
157. Product evaluation sheet
158. Contract for application
159. Research results for informational series under industrial conditions
160. Technical-workshop documentation for the informational series (copy with corrections made after industrial investigations)
161. Product evaluation sheet to permit industrial production
162. Protocol to initiate industrial production
163. Documentation of qualitative characteristics of the technology and product on an experimental scale
164. Postcompletion technical design for semi-industrial installation.
165. Process design on a semi-industrial scale in phase R
166. Product technical requirements
167. Analysis and preparation of phase results for the technological process on an industrial scale together with documentation of changes in the process and installation
168. Product technical requirements on an industrial scale
169. Technical description of process on an industrial scale
170. Test results of experimental version, technology of operation or mining process/method together with conceivable concept for new technical equipment
171. Application results in phase R (technology of operation or mining process/method in the semi-industrial version together with an evaluation)
172. Results of industrial application in phase R (technology of operation or mining process/method)
173. Results of industrial verification of technical-organizational program/project together with its evaluation
174. Design of technical-organizational program/project together with application principles and instructions
175. Results of application of methods together with their evaluation after phase R
176. Description of methods together with application guidelines/instructions after verification in phase R
177. Source documents together with verification and correction instructions after verification in phase R
178. Computer software documentation together with results of industrial testing and application instructions after verification in phase R
179. Results sheets together with principles of production and use after verification
180. Processing technology in computer centers
181. References
182. Arabic numeral designates classification code elements for products and documentation

183. The symbol '0' next to a classification table field means that the characteristics designated by these fields are not identified.
184. Classification codes are formed per the following principles:
185. Number in documentation
186. Unalterable product code
187. Product code taking into account stage of development
188. Documentation code
189. Examples of code formation: A product in group '3,' class '2,' type '3' and stage of development '4' is given the code '323' and the code '3234' which takes into account the stage of development
190. Documentation for that product completed in phase B2/2 designated under number '4' is given the code 323404

Research-Development Application Programs

Warsaw RZECZPOSPOLITA in Polish 6 Sep 82 pp 1, 2

[Interview with Mieczyslaw Kazimierczuk, undersecretary of state of the Ministry of Science, Higher Education and Technology, by Tadeusz Podwysocki; date and place not given]

[Text] The Ministry of Science, Higher Education and Technology as well as the PAN [Polish Academy of Sciences] with the participation of coordinating teams, coreporters and advisers reviewed and verified government research and development programs, complex problems and basic research problems. Also, most programs were discussed by teams and commissions of the Main Council for Science, Higher Education and Technology.

In addition, three interministerial commissions were concerned with the verification and review of basic research. RZECZPOSPOLITA discusses the results of the review and verification with Mieczyslaw Kazimierczuk, undersecretary of state of the Ministry of Science, Higher Education and Technology.

[Question] The basis for the review and verification programs was the government operating schedule for implementing the decisions of the Ninth Extraordinary Congress of the PZPR and the operating schedule for government action presented in the Sejm (25 January 1982) by Wojciech Jaruzelski, chairman of the Council of Ministers. The results of the review and verification of the scientific research programs were considered at a meeting of the Sociopolitical Committee of the Council of Ministers.

[Answer] I will start with the basic question. Economic and cultural needs during this time period of stabilization and diminishing crisis thrust the specified goals and tasks to the fore. Consequently, the so-called large scientific research programs had to be adapted to the country's current and

most important social and economic plans. At the same time, the concern was to maintain Poland's scientific position in those areas and specific projects that are characterized as being world-level projects and achievements, those that have a future, especially for the second half of the 1980s.

[Question] Then we could say that verification is not a painful incision. How certain can we be that the review was proper? And were projects canceled that could provide many benefits for Poland and, in general, for science? The question here is one of verification criteria.

[Answer] Changes were made in research program coordination plans in accordance with designated prerequisites. They concerned eliminating or postponing until future years those projects which realistically could not be included in the 3-year plan.

Will we be able to implement an innovation requiring imported materials and subassemblies from the dollar zone? Research work whose crowning achievement would be large new investments, as well as projects not guaranteeing sufficient, significant economic and technical results were eliminated. The verification also cleansed the research programs of chance projects that were added to basic goals and tasks.

[Question] Mr Minister, could you cite some of these projects whose realization over the new few years would be unrealistic and which have not stood up to the test of time?

[Answer] Of course. But first, I will give examples of research projects that are ready for implementation or application in the economy.

[Question] Please do.

[Answer] For example, take the work on large 600-MW power units and excavators having capacities of 100,000 cubic meters per day. Also, work on underground gasification of coal and research on testing finished products from coal liquification were eliminated.

We are cutting back work on a number of machines and equipment. We eliminated the development of a new generation of R-47 computers and SM-5218 minicomputers as well as the development of large-capacity computer disc memories.

[Question] I understand; they are in reality projects that would have absorbed many millions of zlotys and foreign exchange and the results would not mitigate the crisis. You mentioned, sir, the offerings that science is availing to the economy.

[Answer] Here I must emphasize a very important point, to wit: The review and verification of the research programs means that there will be big changes in the thematic structure of advisable activities in the field of adapting science more closely to the needs of the economy. We have been very

successful in redirecting research programs to meet the needs of the country's social and economic development as designated by the government.

After the verification, 24 percent of the themes in the government research programs involve elimination or substitution of imports, and in complex problems it is over 22 percent. But work that is supposed to save fuel, energy and raw materials absorb 21.9 percent of the government program outlays and 17.7 percent of the complex problem resources. At the third level, and thus a very high level, of investing resources and potential are themes in the area of health and environmental protection.

Following those considerations, here are a couple of examples, and many more can be cited, of research work ready for application or use in the national economy. The Polish-developed method of using silicon raw materials as substitutes for quartz powder can save 300 million zlotys annually in imports.

The production of precision piping according to Polish technology that is used as mechanized casing in coal mines will save \$14 million annually in imports. The system for exploiting thick deposits in copper mining to be implemented in the 1982-1984 period will generate economic results worth up to 150 million zlotys.

The application on an industrial scale of the technology for obtaining pure benzene from coking benzol can provide Poland 300,000 tons annually of this valuable and desired product. And here is yet one more significant offer of science. Benzene production can be increased by 64,000 tons annually, which is worth about 500 million zlotys, if the research and development work is applied to intensifying the refining of raw material (catalytic cracking) by way of improving processes and equipment design. The production of 10 new potato variants can increase yields of edible potatoes from 0.3 to 0.6 tons per hectare, and industrial potatoes from 0.4 to 1.5 tons per hectare.

[Question] It is often said that many projects were completed, that they really represented a valuable and unquestioned accomplishment of Polish science, but to date there truly has never been a green light for innovation. We have much technology and many designs that would greatly reduce the scope of the crisis and would present an export opportunity if they were properly applied. The problem of our participation in the international division of labor and scientific-technical cooperation with the fraternal socialist countries is linked to this. That which we ourselves cannot do appears to be realistic within the framework of CEMA collaboration.

[Answer] Eight government programs and 56 complex problems have been verified. There are many research, development and application projects that assure goal achievement in the next few years. Scientific-technical cooperation with the socialist countries, above all the Soviet Union, not only can accelerate the achievement of results but can also increase them significantly.

We attach great significance to undertaking joint scientific and application projects within the CEMA framework. Thanks to material, subassemblies and

research equipment from the fraternal countries, some innovative solutions will be implemented quickly, to be repaid with scientific-technical ideas and products of high quality and modernity.

[Question] One of the barriers on the road to using the fruits of science was the persistent poor quality of research work results, their detachment from the realities of Polish industry. Raw material, material and energy possibilities were neglected. Unfinished work, lacking characteristics of technological design, occurred. How can these shortcomings and defects of institutions and research teams be avoided?

[Answer] We intend to expand significantly the scope and function of supervision at all levels of research work realization. We proposed to the sociopolitical Committee of the Council of Ministers that the principle of self-supervision and self-evaluation appertain only to the scientific-technical value of executed work. This process should be the responsibility of the coordination-advisory organs for the individual research programs.

On the other hand, a more extensive analysis, economic as well as technical, especially with regard to the effectiveness of applications, must apply to the entire cycle of work, that is, from the programming phase to the accounting of end results phase. Thus, it is necessary for units coordinating research programs and ministries to designate responsible analyses and supervision groups. More extensive use of application agreements will also influence discipline of realization processes.

11899

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NUCLEAR ENERGY PLANS TO YEAR 2000 OUTLINED

Zagreb KEMIJA U INDUSTRIJI in Serbo-Croatian No 9, Sep 82 p 469

[Text] Yugoslavia's expanded nuclear program up to the year 2000 has been adopted in all competent federal bodies, specialized and other commissions, electric power organizations and other organizations. The program proposed still has to go through the process of conclusion of social compacts and self-management accords among the various investors and users of nuclear power plants.

The nuclear program up to the year 2000 calls for construction of six nuclear power plants each with a capacity of 1,000 MW. The Prevlaka NE [nuclear power plant] will be built with the pooled capital of SR [Socialist Republic] Croatia and SR Slovenia; SR Slovenia will finance a nuclear power plant at Dolski near Ljubljana; SR Croatia and SAP [Socialist Autonomous Province] Vojvodina are planning joint construction of an NE on the bank of the Danube near Dalje. Two power plants, each with a capacity of 1,000 MW, will be built with joint investments of Croatia, Serbia and Vojvodina. A decision has been made for Croatia to join Serbia in building the Danube 2 Nuclear Power Plant near Smederevo.

World competition will probably be very keen when partners are chosen for Prevlaka and the other projects, and it will be interesting to see what the first interested partner "Framatome" is offering.

"Framatome," a French manufacturer of equipment for nuclear power plants and indeed of entire nuclear power installations, is interested in participating in construction of the nuclear power plant at Prevlaka through a system of mutual long-term cooperation and 100-percent transfer of nuclear technology. "Framatome" is not interested solely in the job at Prevlaka, but in becoming involved in Yugoslavia's entire long-range nuclear power program.

According to analyses made in "Framatome," Yugoslav industry would become involved in mastering sophisticated technology in the production of nuclear power equipment, and contacts have already been made with the factories "Rade Koncar," "Djuro Djakovic," "Metalna," "Litostroj" and the Steam Boiler Factory in Zagreb.

The problem of nuclear fuel would be solved through maximum use of raw materials from domestic sources, while the French partner would provide for

enrichment of uranium in its own installations on a long-term basis. The French are also offering to solve the problem of nuclear waste, which would be processed in their own factories, and the engineering would be developed for its subsequent geological stabilization. Beyond that the specialists of "Framatome" are offering all the solutions which have already been applied in France in connection with environmental protection.

The period of time over which "Framatome" commits itself to building average nuclear technology is 60 months.

7045

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INNOVATIVE WORK IN SLOVENIA ENCOURAGES INNOVATION IN INDUSTRY

Zagreb KEMIJA U INDUSTRIJI in Serbo-Croatian No 9, Sep 82 p 469

[Text] Particular attention is being paid to innovative activity in Slovenia, since it affords more productive work, better quality and larger income. Adoption of incentives to encourage inventions is being undertaken in an organized way in work organizations of associated labor.

Last year in Slovenia there were about 3,500 innovators, and they produced and applied in practice about 4,000 solutions, and they made it possible to earn an additional amount of about 800 million dinars of income.

Innovative activity was most evident in the metal manufacturing, metallurgical and chemical industries, which employ one out of every five innovators. About 2,500 working people inclined toward creativity are organized in 25 societies of inventors and efficiency experts.

The number of workers who are improving technology at their work station is considerably higher than that. They are improving their work in order to exceed the quotas more easily and quickly, but they do not report their solutions. One of the reasons is the fear that the quotas might be raised, and the income which they earn from surpassing the quota is certainly greater than the lump-sum reward which they would get for their innovation.

Compensation paid to innovators amounts to about 3 percent of the estimated economic benefit which their innovations afford, and sometimes the compensation is even less because of a lack of understanding and envy.

Since the greatest contribution to stabilization is made by inventive workers whose solutions bring additional income to the entire collective and thereby to the broader community as well, the trade unions are advocating that collectives hire professional analysts of innovations and that the Social Compact on Innovations be supplemented. The trade unions go on to favor the extension of credit to finance development of inventive solutions.

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